Patent claims

1. A method of operating a steering device for a vehicle, having a steering actuator for setting the steering angle of the steered vehicle wheels and having a steering handle which is mechanically decoupled from the steering actuator during disturbance-free operation, with a nominal steering angle being determined on the basis of the operation of the steering handle and being set on the steered vehicle wheels, the method comprising:

sensing at least one variable which describes the transverse dynamics of the vehicle;
determining a nominal steering angle based on said at least one variable; and

determining a disturbance influence which acts laterally with respect to the direction of travel from said at least one variable which describes the transverse dynamics of the vehicle or from an assessment variable derived from said at least one variable.

2. The method as claimed in claim 1,
wherein
the disturbance influence is determined from the Fourier transformation of the at least one variable which describes the transverse dynamics of the vehicle.

3. The method as claimed in claim 2,
wherein
the oscillation amplitude and/or the oscillation frequency of the at least one variable which describes the transverse dynamics of the vehicle are/is determined by means of the Fourier transformation.

4. The method as claimed in claim 1, wherein a special operating mode is used when the at least one variable which describes the transverse dynamics of the vehicle is not taken into account in the determination of the nominal steering angle.

5. The method as claimed in claim 4, wherein the determined disturbance influence is used to assess whether the driver can cope with the transverse dynamic control of the vehicle in the instantaneous driving situation, even in the special operating mode.

6. The method as claimed in claim 5, wherein the capability to cope with the driving situation is assessed by evaluation of an oscillation frequency and/or of an oscillation amplitude of the at least one variable which describes the transverse dynamics of the vehicle.

7. The method as claimed in claim 6, wherein it is possible to cope with the driving situation when the oscillation frequency is below a frequency threshold value and/or the oscillation amplitude is below an amplitude threshold value.

8. The method as claimed in claim 6, wherein the frequency threshold value and/or the amplitude threshold value are/is dependent on the vehicle longitudinal speed and/or on the variable which corresponds to the operation of the steering handle.

9. The method as claimed in claim 6, wherein the frequency threshold value and/or the amplitude threshold value are dependent on one another.

10. The method as claimed in claim 5, wherein on identification that it is not possible for the driver to cope with the driving situation, a change is initiated to a driving situation which can be coped with.

11. The method as claimed in claim 10, wherein the change to a driving situation which can be coped with is made by production of optical and/or acoustic and/or tactile driver information signals, with these driver information signals being used to bring about a reduction in the vehicle longitudinal speed by the driver.

12. The method as claimed in claim 10, wherein the change to a driving situation which can be coped with is carried out by automatically influencing the vehicle longitudinal dynamics by operation of the propulsion device and/or of the braking device of the vehicle in order to reduce the vehicle longitudinal speed.

13. The method as claimed in claim 12, wherein the vehicle longitudinal dynamics are also influenced when the driver generates a driving command which is contrary to this.

14. The method as claimed in claim 1, wherein the variable which describes the transverse dynamics of the vehicle is determined by means of the yaw rate and/or the transverse acceleration and/or the steering angle and/or the nominal steering angle and/or internal controlled variables such as the state variable of an observer.

15. A steering device for a vehicle, comprising:
a steering actuator for setting the steering angle on the steered vehicle wheels;
a steering handle which is mechanically decoupled from the steering actuator during disturbance-free operation; and
a computation device which determines a nominal steering angle on the basis of the operation of the steering handle and operates the steering actuator in order to set the steering angle,
wherein,
at least during disturbance-free operation, at least one variable which describes the transverse dynamics of the vehicle is taken into account by the computation device in the determination of the nominal steering angle, and wherein a disturbance influence which acts laterally with respect to the direction of travel is determined by the computation device from this variable which describes the transverse dynamics of the vehicle.

16. The steering device as claimed in claim 30, wherein a special operating mode is used when the at least one variable which describes the transverse dynamics of the vehicle is not taken into account in the determination of the nominal steering angle, with the special mode being activated in particular by setting up a

mechanical and/or hydraulic connection between the steering handle (14) and the steered vehicle wheels (11).

17. A steering device for a vehicle, comprising:

a sensor to generate a first signal indicative of a transverse dynamics of said vehicle; and

a computation device to generate a second signal if said first signal indicates that said transverse dynamics is greater than a predetermined transverse threshold dynamics indicative of unsafe transverse dynamics of said vehicle.

18. The steering device of claim 17, wherein said first signal is indicative of a yaw rate of said vehicle.

19. The steering device of claim 17, wherein said first signal is indicative of a transverse acceleration of said vehicle.

20. The steering device of claim 17, wherein said first signal is indicative of a steering angle of a steering wheel of said vehicle.

21. The steering device of claim 17, wherein said first signal is indicative of a nominal steering angle of a steering wheel of said vehicle.

22. The steering device of claim 17, further comprising an optical device responsive to said second signal to alert a driver of said vehicle of unsafe transverse dynamics of said vehicle.

23. The steering device of claim 17, further comprising an audible device responsive to said second

signal to alert a driver of said vehicle of unsafe transverse dynamics of said vehicle

24. The steering device of claim 17, further comprising a tactile device responsive to said second signal to alert a driver of said vehicle of unsafe transverse dynamics of said vehicle.

25. The steering device of claim 17, further comprising a propulsion device responsive to said second signal to lower a longitudinal speed of said vehicle if said second signal indicates an unsafe transverse dynamics of said vehicle.

26. The steering device of claim 17, further comprising a braking device responsive to said second signal to lower a longitudinal speed of said vehicle if said second signal indicates an unsafe transverse dynamics of said vehicle.

27. The steering device of claim 17, wherein said computation device determines an oscillation frequency and/or an oscillation amplitude related to said first signal.

28. The steering device of claim 27, wherein said computation device determines said oscillation frequency and/or said oscillation amplitude by performing a Fourier transform on said first signal.

29. A method comprising:

sensing a transverse dynamics of a vehicle; and

alerting a driver of said vehicle and/or controlling a movement of said vehicle if the sensed transverse dynamics is greater than a predetermined unsafe transverse dynamics.

30. The method of claim 29, wherein sensing a transverse dynamics of said vehicle comprises sensing a yaw rate of said vehicle.

31. The method of claim 29, wherein sensing a transverse dynamics of said vehicle comprises sensing a transverse acceleration of said vehicle.

32. The method of claim 29, wherein sensing a transverse dynamics of said vehicle comprises sensing a steering angle of a steering wheel of said vehicle.

33. The method of claim 29, wherein sensing a transverse dynamics of said vehicle comprises sensing a nominal steering angle of a steering wheel of said vehicle.

34. The method of claim 29, wherein alerting said driver of said vehicle comprises optically alerting said driver.

35. The method of claim 29, wherein alerting said driver of said vehicle comprises audibly alerting said driver.

36. The method of claim 29, wherein alerting said driver of said vehicle comprise tactily alerting said driver.

37. The method of claim 29, wherein controlling said movement of said vehicle comprises reducing a longitudinal speed of said vehicle.

38. The method of claim 37, wherein reducing said longitudinal speed of said vehicle comprises operating a propulsion device of said vehicle.

39. The method of claim 37, wherein reducing said longitudinal speed of said vehicle comprises operating a braking device of said vehicle.

40. The method of claim 29, further comprising determining an oscillation frequency and/or an oscillation amplitude related to said sensed transverse dynamics.

41. The method of claim 40, wherein determining said oscillation frequency and/or said oscillation amplitude comprises performing a Fourier transform on said sensed transverse dynamics.